

1 1. A method of estimating a pose of a human head in natural scenes comprising
2 the steps of:

3 generating, a sparse representation of a human face;

4 training, the sparse representation to a set of face(s) in known poses; and

5 determining, a pose of a head by comparing the trained representation(s)
6 to a facial image.

1 2. The method according to claim 1 further comprising the steps of:

2 transforming a raw facial image into sets of vectors representing fits of the
3 face to a random, sparse set of model configurations (the sparse
4 representation).

1 3. The method according to claim 2 wherein the transforming step further
2 comprises the step of:

3 collecting, salient features of the face image which are useful to estimate
4 the pose of the face.

1 4. The method according to claim 3 wherein the transforming step further
2 comprises the step of:

3 suppressing, irrelevant variations of face appearance.

1 5. The method according to claim 4 wherein the training step further comprises
2 the step of:

3 learning, using Support Vector Regression (SVR), a relation between the
4 sparse representation and the pose(s).

6. A method of estimating the pose of a human head in a natural setting
comprising the steps of:

5 constructing, a set of sparse representation filters (SRF) to accumulate
 edge response along a boundary of a facial landmark, shaped such
 that the response is smooth with respect to the changes in the position
 and the shapes, between a model and image data;

 applying, SRF to training images producing $SRF(I_\alpha)$;

 training the relation $SRF(I_\alpha) \rightarrow pose(I_\alpha)$;

 determining a sparse representation $SR(J_\alpha)$ for each subject image J_α ;

10 and

 determining, a pose of the subject image.